SOCIETIES AND ACADEMIES.

ZOOLOGICAL CLUB, UNIVERSITY OF CHICAGO, WINTER QUARTER, 1901.

II.

At the meeting of February 6 the program consisted of a paper by Mr. C. M. Child, entitled 'Regulation in *Stenostomum*.'

This paper dealt chiefly with some of the phenomena of regulation following the cutting of an asexual chain of *Stenostomum*-zooids at various points. Some of the more important points are as follows:

The changes which occur after cutting a chain of *Stenostomum*-zooids differ greatly according to the position of the cut with respect to the zones of fission and according to the stage of development of the latter.

Pieces above a certain relative size, cut within the limits of a single zooid, regenerate the anterior and posterior ends without the formation of a distinct bud of new tissue, although proliferation occurs at the cut surfaces. A very rapid change of form occurs, the piece becoming longer and more slender and acquiring the 'normal' form of a *Stenostomum* individual. The time required for the completion of the regulation varies with the temperature, but is in all cases very short. At a temperature of 75° F. it is only three or four days.

If the piece consists of parts of two or more zooids, *i. e.*, if it contains one or more zones of fission, the processes of regulation are more complex. In pieces consisting of the posterior portion of one zooid and the anterior portion of the succeeding zooid the changes depend upon the stage of development of the organs about the zone of fission. If the zone of fission be at a very early stage it may disappear entirely, the whole piece becoming a single individual with head and tail at the two ends. In this case the part which was destined to become the posterior half of an individual becomes, in consequence of its separation from the chain, the anterior half, while the portion behind the zone of fission, which was destined to become the anterior half of an individual, now becomes the posterior half.

If the zone of fission is older, *i. e.*, if the new brain behind it is well established, all that portion of the piece which lies in front of the zones of fission is absorbed by the part posterior to it, *i. e.*, the part which possesses the brain. This occurs even though the anterior piece is much the larger. As the anterior piece is absorbed it is reduced in size, and the zone of fission and the brain appear to migrate in the anterior direction until finally they reach the anterior end of the whole piece, *i. e.*, until the anterior part is completely absorbed. In a recent paper (*Proc. Cal. Acad. of Sciences*, Ser. III., Zoology, Vol. I., No. 6, 1901) Ritter and Congdon have asserted that the brain actually does migrate in pieces of this kind. This seems to be an error of interpretation. Continuous observation of the pieces shows that the facts are as stated above. Indeed, the migration of the intestine out of the anterior piece can be observed.

If the zone of fission has reached a late stage of development, so that the brain of the posterior zooid is well formed and the pieces are more nearly ready to separate, little or no absorption of the anterior piece occurs and the two pieces separate as they would under normal conditions, the anterior pieces developing a new head and the posterior piece a new tail at the respective cut surfaces.

The absorption, when it occurs, is always in the posterior direction, *i. e.*, the part deprived of a brain is absorbed by the part which still retains the brain. The actual disappearance of the zone of fission occurs only in the early stage when the brain posterior to it is not developed or is at a very early stage of development. In general the results depend upon the presence or absence, or the relative development, of the brains in the parts of zooids which make up the pieces.

In sexual individuals of *Stenostomum* asexual multiplication ceases, though the single individual may attain a length as great as a chain of eight or more sexual zooids. The power of regeneration in sexual individuals is not as great as in the asexual chains. The energy of the body appears to be directed in large part toward the elaboration of the sexual products, the consequence of this condition being the cessation of asexual multiplication and the reduction of the power of regeneration.

The session of the Club held on February

20 was devoted to an account by Mr. E. H. Harper of 'Regeneration in *Nais lacustris*.' The paper comprised the results of experiments on both sexual and asexual individuals of this species. The following is a brief abstract:

In the asexual forms where from one to five anterior segments are removed the same number is regenerated as was cut off. In this region in the sexual forms the head segment alone is regenerated, or frequently the surface heals over without regenerating.

When more than five segments are removed in the asexual forms a pharyngeal region of five segments is regenerated. In the sexual animals the process is much slower and in an advanced sexual stage a dwarfed region of five very short segments is produced. The clitellum and sexual organs may be regenerated. This has been seen to occur after a considerable time.

So far as could be determined mutilation never causes the disappearance of the sexual organs, but the formation of a regenerating region will under certain conditions inhibit the process of asexual multiplication and cause the disappearance of the zone of fission. This effect may be produced by a cut anterior to the zone of fission, less often by a cut posterior to it, and occurs only when the zone is embryonic. The zone is also more likely to disappear if the cut is near to it. The band of transparent embryonic tissue redifferentiates and the energy of growth is transferred to the regenerating region.

In the asexual individuals the power of regeneration is less in the anterior specialized region and also in the posterior budding region than in the middle of the body. Short posterior pieces may live a considerable time, but do not regenerate. Anterior pieces of eight or nine segments may survive a short time without regenerating, but pieces of the same length from the middle of the body regenerate freely.

Internal conditions favorable to proliferation, such as the exposure of cut surfaces of intestine and blood vessels, are present in nearly all possible experiments. But if a corner of the head segment be removed, including the prostomium, without injuring the pharynx, the ectoderm will close over the surface and regeneration will not take place. In the sexual forms failure to regenerate may occur when the pharynx is cut through. Here the tendency to proliferate is slight and it may be that the epithelium differentiates completely over the cut surface before any appreciable amount of regeneration has occurred. And it is probable that after the epithelium is formed there is no further tendency to regenerate.

Growth takes place at right angles to a cut surface; and if the cut is oblique the bud will grow out at an angle to the axis of the body. Straightening is effected after the penetration of the lumen of the intestine into the region under the influence of its peristaltic motions.

Many of the internal phenomena of regeneration may be observed in the living animal on account of the transparency of the body wall. Migration of pigmented cells from the intestine toward a regenerating region can be seen. If a corner of the head segment be cut off, including one eye, the pigmented portion of the other eye is usually fragmented and pigment migrates in various directions.

It has been stated that the regenerative power of these animals varies with the season of the year, being less in autumn and winter. No evidence of this has been observed, but the evidence points rather, as we have seen, to an inverse correlation between regenerative power and sexual activity. Budding, *i. e.*, asexual, individuals regenerate freely and completely in December. The sexual forms are found from October to December.

The program for the meeting of March 6 consisted of two papers, 'The Excretory System of the Bryozoa,' by Miss A. W. Wilcox, and 'Montgomery on the Spermatogenesis of *Peripatopsis*,' by Mr. E. R. Downing.

Miss Wilcox reviewed the literature upon the excretory organs of the Bryozoa and gave the results of some work of her own on the Phylactolæmata. Her paper will appear in full elsewhere.

Mr. Downing's paper consisted of a review and discussion of Montgomery's recent study of the spermatogenesis of *Peripatopsis*.

C. M. CHILD.

THE NEW YORK SECTION OF THE AMERICAN CHEMICAL SOCIETY.

THE last meeting of the season of the New York Section of the American Chemical Society was held on Friday evening, June 7, at the Chemists' Club, 108 West 55th Street. Dr. Charles A. Doremus occupied the chair.

The chairman delivered his annual address on 'The Development of an American School of Chemistry,' in which he urged the advancement of chemical engineering by the development of originality and the assumption of greater responsibilities by chemists.

The secretary's report showed a net gain in membership of sixty during the year, and that twenty-nine papers had been read at the nine meetings which were held.

The election of officers for 1901–1902 resulted as follows:

Chairman—Professor Marston T. Bogert (Columbia University).

Vice-chairman—Durand Woodman (127 Pearl Street, N. Y.).

Secretary-treasurer—Professor J. A. Mathews (Columbia University).

Executive Committee—P. C. McIlhiney (Columbia), Professor E. H. Miller (Columbia), T. C. Stearns (Jersey City).

Delegates to the Scientific Alliance: Wm. McMurtrie, Professor Marston T. Bogert, H. C. Sherman (Columbia University).

Papers were read as follows:

M. T. Bogert and L. Boroschek—'Some Experiments with the Mono-nitro-orthophthalic Acids.'

H. C. Sherman, J. L. Danziger, L. Kohnstamm—'On the Maumené Tests for Oils.'

E. F. Kern—'On the Separation and Determination of Uranium.'

The paper on the 'Maumené Test for Oils' was a brief account of the principal results obtained in a series of experiments on several varieties of oils, with different modifications of the Maumené test. The common practice of diluting oils with petroleum to prevent too violent a reaction was found to give unsatisfactory results, the figures obtained from such mixtures being too high; as was also the case when the oil was dissolved in an equal weight of carbon bisulphide or chloroform. The necessity of taking account of the specific heats of the oils and diluents was noted. In order to avoid the necessity of diluting the oil and the resulting uncertainty in the interpretation of results, the use of a weaker acid was proposed. Sulphuric acid of about 87 per cent. can be added directly to all the common oils and the test can be carried out in exactly the same way for the drying as for the non-drying oils. Even when calculated as 'specific temperature reaction' the results are somewhat influenced by the strength of the acid used, higher figures being obtained with the more concentrated acids. It was, therefore, recommended that the test be always made with acid of such strength as will give with water a rise of 33° to 34° C.

It was announced that the courtesies of the society had been extended to Professor Van't Hoff, and a motion was made and unanimously carried authorizing the chairman and executive committee to take such measures and make such preparations as might be required for entertaining Professor Van't Hoff.

The meeting then adjourned until October.

DURAND WOODMAN,
Secretary.

DISCUSSION AND CORRESPONDENCE.

EBBINGHAUS'S THEORY OF COLOR-VISION.

IN proposing his specialization of Hering's theory of color-vision, Ebbinghaus had for an object to give it a basis in fact by showing a connection between the kind of light which must be absorbed by the colored substances in the retina and the subjection distribution of color throughout the spectrum as revealed by color-equations—especially those of the partially color-blind. The connection was a very forced one from the beginning: the visual yellow could stand very well as the absorbent of the light necessary to the production of the sensation blue, but the visual purple ought to have been *blue* in color to fulfill its function of absorbent of the light that causes the sensation *yellow*, while in reality it is not even purple (in the English sense of the word), but magenta; and the existence of a visual green and a visual red was purely hypothetical. Thus of the four colored absorbent substances to which so